Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation

Development of a Flammability Standard for Testing the Smolder Resistance of Upholstered Furniture

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Research conducted by the Bureau revealed that heavier smolder prone fabrics (such as the standard cotton velvet fabric, 10.56 oz/sq. yd) when exposed to a smoldering cigarette impart more energy to the mock-up substrates, resulting in significant weight loss of the PU foams (Table 1). In many cases, the foams were totally consumed. When the cover fabrics were changed to less smolder prone fabrics (e.g. light weight cotton sheet, 5.46 oz/sq. yd), smoldering resistance of the mock-up assembly significantly improved and the weight losses of the foam were less than one percent. These results were consistent with the observations made by CPSC.

Testing results further revealed that char length of tested cover fabrics is another viable way to indicate the smoldering propensity of the fabrics (Table 2). In addition, the smoldering resistance of a heavy smolder prone fabric can be significantly improved by placing a barrier (interliner) material underneath (Table 3).

Table 1. Smoldering Performance of Mock-ups

Combination			
Cover Fabric	**Interliner**	**Foam**	**Foam Recovery**
light weight cotton sheet	--	Foam A	99.7%
light weight cotton sheet	L	Foam A	99.4%
light weight cotton sheet	J	Foam A	99.6%
light weight cotton sheet	G	Foam A	99.7%
light weight cotton sheet	M	Foam A	99.9%
Cotton Velvet	--	Foam A	79.6%
Cotton Velvet	S	Foam A	0.0%
Cotton Velvet	A	Foam A	0.0%
Cotton Velvet	B	Foam A	0.0%
Cotton Velvet	C	Foam A	0.0%
Cotton Velvet	E	Foam A	0.0%
Cotton Velvet	J	Foam A	63.5%
Cotton Velvet	N	Foam A	69.4%
Cotton Velvet	K	Foam A	74.2%
Cotton Velvet	D	Foam A	75.8%
Cotton Velvet	G	Foam A	76.6%
Cotton Velvet	P	Foam A	78.4%
Cotton Velvet	I	Foam A	78.5%
Cotton Velvet	F	Foam A	80.2%
Cotton Velvet	Q	Foam A	82.0%
Cotton Velvet	H	Foam A	83.0%
Cotton Velvet	O	Foam A	99.4%
Cotton Velvet	R	Foam A	100.0%
Cotton Velvet	E	Foam B	33.2%
Cotton Velvet	B	Foam B	37.7%
Cotton Velvet	C	Foam B	42.1%
Cotton Velvet	A	Foam B	78.8%
Cotton Velvet	D	Foam B	88.0%
Cotton Velvet	--	Foam B	98.9%
--	--	Foam A	99.8%
--	D	Foam A	99.5%
--	E	Foam A	99.1%
--	I	Foam A	99.6%
--	K	Foam A	99.8%
--	J	Foam A	99.7%
--	H	Foam A	99.8%
--	F	Foam A	99.9%
--	G	Foam A	99.9%
--	C	Foam A	99.9%
--	E	Foam B	99.4%
--	D	Foam B	99.7%

Table 2. Char Length on Cover Fabric vs. Weight Loss of Foam

Fabric	Batting	Foam	Max. Char Length (mm)	Weight Loss
Rayon	--	Foam A	65	8%
Velvet Cotton	--	Foam A	67	20%

Table 3. Performance of Fabrics and Foams with Batting Materials

	Batting	Foam	Max Char Length (mm)	Self-extinguished at 45 min	Weight Loss
Velvet Cotton	--	Foam A	67	N	20.0%
Velvet Cotton	Batting 1	Foam A	17	Y	0.0%
Velvet Cotton	Batting 2	Foam A	20	Y	0.2%
Velvet Cotton	--	Foam D	54	N	5.7%
Velvet Cotton	Batting 2	Foam D	15	Y	0.2%
Velvet Cotton	Batting 1	Foam D	17	Y	0.3%
Velvet Cotton	--	Foam E	51	N	16.5%
Velvet Cotton	Batting 2	Foam E	26	Y	0.7%
Velvet Cotton	Batting 1	Foam E	19	Y	0.1%